IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**Mail Stop AF**
Robert J. Steger	Group Art Unit: 1763
Application No.: 10/608,091	Examiner: RAKESH KUMAR DHINGRA
Filed: June 30, 2003	Confirmation No.: 8130
For: SUBSTRATE SUPPORT HAVING DYNAMIC TEMPERATURE CONTROL	

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner for Patents
P.O. Box 1450
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Sir:

Applicant requests review of the rejection of Claims 1-3, 5-12, 15-23, 32 and 33. The May 12, 2008 Advisory Action indicated that the After Final Amendment would be entered upon filing of a Notice of Appeal submitted herewith.

Overview

Claims 1, 2, 10, 12, 15, 16, 21 and 23 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Yatsuda et al. (U.S. Patent No. 6,488,863) ("Yatsuda") in view of Chiang et al. (U.S. Patent No. 6,800,173) ("Chiang") and Ramanan (U.S. Patent No. 6,529,686) ("Ramanan"). The remaining claims are rejected over additional references cited only for features of the dependent claims. As such, only the rejection of independent Claims 1 and 15 is addressed.

A. Claimed Subject Matter

Claims 1 recites, *inter alia*, a substrate support useful in a reaction chamber of a plasma processing apparatus, the substrate support comprising, a metallic heat transfer member overlying the ceramic member, the heat transfer member having a maximum thickness of about ¼ inch, the heat transfer member including at least one

flow passage through which a liquid can be circulated to heat and cool the heat transfer member; a controller operable to control the volumetric flow rate and/or the temperature of the liquid circulated through the at least one flow passage, so as to control heating and cooling of the heat transfer member at a rate of from about 0.25-2°C/sec wherein heating is performed solely by the heat transfer member (emphasis added).

Claims 15 recites, *inter alia*, a substrate support useful in a plasma processing apparatus, comprising, a metallic heat transfer member overlying the ceramic member, the heat transfer member including at least one flow passage in fluid communication with the liquid source and through which the liquid can be circulated to heat and cool the heat transfer member at a rate of from about 0.25-2 °C/sec wherein heating is performed solely by the heat transfer member (emphasis added).

A. The Examiner's Position

The final Official Action contends that Yatsuda discloses a ceramic member 20, a metallic heat transfer member 18 including cooling passages 34 through which liquid can be circulated and misinterprets Chiang as disclosing temperature controlled fluid 76 to control heating of substrate 8 (Final Rejection at page 5). Recognizing that Yatsuda and Chiang do not disclose a heat transfer member having a maximum thickness of about ¼ inch, Ramanan is cited for the disclosure of a low thermal mass heating member (final Official Action at pages 5-6, bridging paragraph).

B. Missing Claim Feature

As discussed below, even if Yatsuda, Chiang and Ramanan were combined in the manner as suggested by the Examiner, the features of a "heat transfer member having a maximum thickness of about ¼ inch ... including at least one flow

passage through which a liquid can be circulated to heat and cool the heat transfer member" as recited in Claim 1 or a "heat transfer member including at least one flow passage ... through which the liquid can be circulated to heat and cool the heat transfer member at a rate of from about 0.25-2 °C/sec" as recited in Claim 15 are still missing from the cited references.

1. **Prior Art Fails to Teach a Metallic Heat Transfer Member with Liquid Circulated Therein for Heating and Cooling at 0.25 to 2°C/sec**

Yatsuda, Chiang and Ramanan disclose substrate supports with resistance heating plates in contact with water cooled blocks to heat or cool a substrate. For instance, while the Examiner contends that Chiang heats with cooling water, Chiang actually discloses a resistive heater 72 to heat and a separate massive cooling plate 110 to cool substrate 8. With regard to the missing claim limitation of a metallic heat transfer member which circulates liquid to heat and cool at 0.25 to 2°C/sec, the Final Rejection contends:

> 1. It would have been obvious to select a thickness of the claimed heat transfer member to obtain a desired thermal response, because Ramanan discloses a low thermal mass heating member between 0.06 and 0.25 inch (final Official Action at page 5, lines 16-25).
> 2. The selection of the thickness of the heat transfer member is a result-effective variable (final Official Action at page 6, lines 1-3).

a. **Predictable Results Lacking**

In combining Ramanan with the remaining references it is incumbent on the Examiner under the Examination Guidelines for Determining Obviousness 72 Fed. Reg. 57526-57530 (Oct. 190, 2007), to show that the results of substituting the thickness of Ramanan's resistive heater plate for the thickness of Yatsuda's water cooled jacket 34 would have led to predictable results. However, Yatsuda's thin plate resistive heater fails to provide any predictability as to resultant heating rates

using a thin plate with a liquid flow passage therein. The Final Rejection also fails to show that the thickness of Applicant's claimed heat transfer member is a result-effective variable for the claimed heating and cooling rates using liquid for both heating and cooling.

b. Teachings Away

While Ramanan discloses a resistance heated backplate **20** with a "low thermal mass," including "one or more heating elements ... " (column 13, lines 43-48), Ramanan does not relate to use of heat transfer liquids and clearly fails to teach a backplate with passages in which a liquid is circulated. Instead, Ramanan discloses a separate cooling member, i.e., "a thermally massive heat sink" (Emphasis added, column 13, lines 59-61) which includes cooling channels **28** for the circulation of a liquid (column 13, line 66 to column 14, line 6) which is brought into contact with the resistively heated member when cooling is desired (column 12, lines 48-52). Thus, like Yatsuda and Chiang, Ramanan teaches away from a single heat transfer member which can heat and cool at the claimed rates using a heat transfer liquid.

c. Lack of Motivation to Heat with Liquid Circulated in Thin Plate

The final Official Action contends that worktable **18** of Yatsuda corresponds to Applicant's "heat transfer member" (final Official Action at page 4, lines 7-9). Yatsuda discloses a "cooling jacket **34** like a passageway is formed in the worktable **18**, so that the wafer W is kept at a predetermined temperature by causing a coolant to flow in the jacket **34**" (column 3, lines 53-55; FIG. 1). However like Ramanan, worktable **18** (with cooling jacket **34**) of Yatsuda is a thick, massive cooling structure. As such, like Ramanan, Yatsuda teaches away from a metallic heat transfer member

which heats and cools at 0.25 to 2°C/sec using liquid circulated through the heat transfer member. In addition, Yatsuda fails to teach a work table **18** "having a maximum thickness of about ¼ inch." Accordingly, Yatsuda in view of Ramanan, fails to teach all claim limitations recited in Claims 1 and 15.

d. Misinterpretation of Chiang

Like Ramanan and Yatsuda, Chiang discloses a substrate support with a resistive heater 72 embedded in ESC 6 and a separate cooling plate 110 in contact with ESC 6 (column 20, lines39-49). The Final Rejection apparently equates cooling plate **110** of Chiang to Applicant's "heat transfer member" (final Official Action at page 4, lines 7-9). Chiang discloses cooling plate **110** attached to baseplate **112** with coolant channels **78** for the flow of water (column 21, lines 7-10; FIG. 27A) and uses a separate heating member (ESC 6) having a resistive heater to heat a wafer. As such, Chiang has been misinterpreted in the Final Rejection and Yatsuda in view of Chiang and Ramanan fails to teach all claim limitations recited in Claims 1 and 15.

Conclusion

For at least the reasons stated above, the Examiner has not established a *prima facie* case of obviousness. Therefore, the outstanding rejections are improper and should be withdrawn.

Respectfully submitted,

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